Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

A280.29
F22G
cop.2

cooperative marketing of NONFAT DRY MILK to commercial outlets

by Earl B. Miller

U. S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY

FEB 8 1966

CURRENT SERIAL RECORDS

FARMER COOPERATIVE SERVICE•U.S. DEPARTMENT OF AGRICULTURE•GENERAL REPORT NO. 129•SEPTEMBER 1965

UNITED STATES DEPARTMENT OF AGRICULTURE
FARMER COOPERATIVE SERVICE
Washington, D.C.
Joseph G. Knapp, Administrator

The Farmer Cooperative Service conducts research studies and service activities of assistance to farmers in connection with cooperatives engaged in marketing farm products, purchasing farm supplies, and supplying business services. The work of the Service relates to problems of management, organization, policies, financing, merchandising, product quality, costs, efficiency, and membership.

The Service publishes the results of such studies; confers and advises with officials of farmer cooperatives; and works with educational agencies, cooperatives, and others in the dissemination of information relating to cooperative principles and practices.

Contents

Page

Summary i

Objectives and Procedures 1

Cooperatives selling nonfat dry milk. 2
  Types of cooperatives 2
  Physical plants 2
  Output and distribution 2
  Production costs 4
  Selling costs 4
  Sales and service staffs. 5
    Job qualifications 5
    Nature of customer contacts 5
    Service to customers. 5
  Quality controls. 6
  Some characteristics of federated cooperatives. 6
  Special marketing problems of cooperatives 7
    Renewal of orders. 7
    Government rejection of dry milk. 7
  Sellers' comments 8

Commercial users of nonfat dry milk 8
  Source of supply and purchasing practices 8
  Selection of suppliers 9
    Prices paid by commercial users. 9
  Use of nonfat dry milk by commercial users. 9
    Manufacturers of confectionery products. 11
    Meat processors. 11
    Makers of baked goods and bakery mixes. 11
    Dairy concerns. 11
    Products competing with nonfat dry milk. 11
  Inplant service. 12
  Quality controls. 13
  Contact with suppliers. 13

Conclusions 15

Summary

How well are dairy cooperatives meeting the needs of commercial users of nonfat dry milk? To answer this basic question and to determine how products sold and services provided to commercial users might be improved, the Farmer Cooperative Service obtained data from 11 cooperatives manufacturing one-third of the total amount of nonfat dry milk produced in the United States, and from 20 commercial firms representing the major types of users of nonfat dry milk.

Of the 11 cooperatives studied, 4 were centralized, 6 federated, and 1 was a combination of the two.

In 1960, 10 of the 11 cooperatives produced over 805 million pounds of nonfat dry milk of from two to seven different types.

Orders for dry milk were usually those for extra grade spray of high, low, or medium heat. In 1960, representatives of nine cooperatives reported that over 30 sets of specifications were submitted by commercial users of nonfat dry milk.

Although some cooperatives reported that they could produce nonfat dry milk to meet certain specifications at no additional cost, they estimated that their production costs for most special grades ranged from 0.1 to 2.5 cents per pound more than those for the basic extra grades.

All of the 11 cooperatives employed sales and technical personnel. Employees hired to handle these two phases of their operations were required to have certain qualifications. Technical employees were required to hold college degrees in their areas of specialization. Sales employees, on the other hand, were hired on the basis of sales ability and experience.

Cooperatives contacted customers far more often to sell products than to provide services. A large number of the sales contacts were made by telephone. Service calls were usually made in person and in response to the complaints of customers. Only two cooperatives made routine calls to discuss a customer's needs and his use of nonfat dry milk.

Cooperatives indicated that sales of nonfat dry milk could be further expanded by producing dry milk that more nearly met the customers' needs or by producing special products containing dry milk.

All of the cooperatives had quality control programs to insure that their products met certain standards. Each administered, either in its own centralized laboratory or in the laboratory of a member organization, multiple tests of dry milk samples. They also used extensively outside agencies, both Government and private, for this purpose.

Dissatisfaction with the price of dry milk was the main reason customers failed to renew orders. Only one association reported that a buyer failed to re-order because it could not take care of his specific needs.

Only 20 percent of the 20 commercial users interviewed for this study were supplied dry milk by cooperatives exclusively. An additional 40 percent bought some of their dry milk from cooperatives. Price and quality were the main factors influencing users in their selection of a supplier.

Extra grade powder was used by all manufacturers. High heat powder was used by all except producers of confectionery products. Manufacturers of dairy products used low

heat powder in some of their products; confectioners used it exclusively. One baker used medium heat dry milk.

Confectioners use nonfat dry milk because it is easy to handle and store and because it is less costly than whole milk. Manufacturers of dairy products use it because it is a good fortifier, a good substitute for liquid counterparts, it makes a good finished product, and also because its price is good. Bakers and bakery mix manufacturers like it because it adds color and flavor to baked goods and improves their eating and keeping qualities. Meat packers use it primarily as an extender.

Condensed whey solids and buttermilk powder were used most often as substitutes for dry milk because they were less costly than other substitutes and yet of comparable quality.

All of the users tested their final products and most of them did some testing of product ingredients, including nonfat dry milk.

Cooperatives offer their commercial users a fairly wide range of technical assistance on research, quality controls, and production. Users of nonfat dry milk felt the inplant service rendered by the cooperatives was good, though only half reported receiving it. The few who reported this service as inadequate considered the agents deficient in technical knowledge.

Sales efforts by cooperatives were considered by more than half of the users to be strong and effective. For the most part, salesmen provided users with the information they needed. When an individual salesman could not supply requested information, he was often able to get it from another source.

Although cooperatives generally met the requirements of customers, the study indicates some need for closer liaison between sellers and users on technical knowledge of the use of nonfat dry milk in the production of certain products.

Three things that might improve marketing operations are (1) more direct contact between the cooperative manufacturer and the user, (2) better training of salesmen (those employed by brokers as well as those representing cooperatives) in the technical aspects of the use of dry milk in specific products, and (3) more coordination of sales and service activities to supply the user with whatever technical help he desires.

NOTE: In this publication, the term "dry milk" means nonfat dry milk.

Cooperative Marketing of NONFAT DRY MILK to Commercial Outlets

By Earl B. Miller
Dairy Branch, Marketing Division

Dairy cooperatives produce a large share of the total amount of nonfat dry milk produced in the United States. According to a study conducted by the Farmer Cooperative Service (FCS),[1] about two-thirds of the production, including that used as animal feed, was manufactured by cooperatives in 1957. It was estimated that over 190 cooperative associations manufactured the product.

Between 1940 and 1963, the amount of nonfat dry milk produced for human food increased from 332 million to 2,096 million pounds. The equivalent in whole milk was 7.2 percent of that sold wholesale by farmers in 1940 and 20.0 percent of that sold wholesale in 1963.

The United States produces more dry milk than its civilians consume. In 1940, approximately 92 percent of the nonfat dry milk produced for human food was used for domestic civilian consumption. By 1962, the proportion of total output used for this purpose was approximately 48 percent. Dry milk, therefore, is a surplus commodity. In 1949, the Commodity Credit Corporation purchased approximately 35 percent of the total production; in 1963, it purchased approximately 48 percent.

Since dry milk is a surplus commodity, it would be advantageous to both cooperatives and the Federal Government if sales to commercial users could be expanded. To gain a better understanding of the problems involved in marketing nonfat dry milk and of the practices employed by cooperatives marketing the product, FCS obtained data from a representative group of dairy cooperatives and commercial users.[2]

Objectives And Procedures

The primary intent of this study was to determine where marketing practices could be strengthened to improve marketing efficiency, and thus to increase returns to farmers as patrons of cooperatives. It is also necessary to be sure that commercial users can depend on cooperative manufacturers for a supply of dry milk that meets their specific needs.

This study, which contains data heretofore unavailable, will provide managers with information that will be helpful in making better business decisions. Commercial users of nonfat dry milk and State and Federal researchers concerned with dairy marketing problems will also find these data useful.

---

[1] Gessner, Anne L. Integrated Dairy Operations Through Farmer Cooperatives. U.S. Dept. Agr., Gen. Rpt. 69, Nov. 1959.

[2] Most of the data used in this study were collected in 1961, but analysis had to be set aside until 1963-64, when personnel were available to complete the report. The information pertains to market practices and services that did not change substantially from year to year. Therefore, present findings have much the same application as they did at the time this study was first undertaken.

As far as can be determined, this is the first study that combines an analysis of the experiences and practices of manufacturers with a study of the experience of users.

Eleven cooperatives and 20 commercial users were selected for the study. The 11 cooperatives selected for study accounted for approximately one-third of the total U.S. production of nonfat dry milk.

When non-Government domestic sales of nonfat dry milk in 1950, 1960, and 1963[3] were compared, over 90 percent of those to commercial users, excluding sales of packaged milk for home use, were accounted for by five outlets--bakeries, manufacturers of dairy products, meat processors, prepared dry mix manufacturers, and confectioners. The commercial users selected for this study represent each of the above group of buyers. Data from makers of baked goods and bakery mixes were treated as information from a single group because of the similarity in their use of dry milk.

In 1961, FCS representatives interviewed the managers of the cooperatives and commercial users selected. Questions were framed to bring to light problems encountered by both the seller and the buyer. Managers of cooperatives were interviewed to obtain information on (1) sales and prices of dry milk in 1960, (2) productive capacity of cooperatives, (3) types of powder produced, (4) marketing methods, (5) the effectiveness of the quality control and inplant assistance programs, and (6) costs and problems connected with making a product to exact specifications. Commercial users were interviewed to determine (1) the extent to which firms used nonfat dry milk and how successful they were in using it, (2) preferences for types of dry milk, (3) problems connected with the use of nonfat dry milk, and (4) methods of purchase and source of supply. Findings based on an analysis of the information supplied are reported in this study.

Cooperatives Selling Nonfat Dry Milk

Types of Cooperatives

Six of the 11 cooperatives were federated organizations consisting of affiliated member associations. Four were centralized cooperatives made up of farmer members, and one combined features of both federated and centralized associations.

Physical Plants

Each of the 11 cooperatives was made up of from 1 to 39 plants. The federations consisted of from 6 to 39 plants, and the centralized cooperatives operated from 1 to 2 plants.

Spray dryers were used in the plants of all 11 cooperatives. Each cooperative had from 3 to 53 dryers. In addition to spray dryers, 7 cooperatives used roller dryers, the number operated by each ranging from 1 to 13. The total hourly capacity of spray dryers among the cooperatives ranged from 3,250 to 53,000 pounds of dry milk. That of roller dryers ranged from 300 to 5,200 pounds.

Output and Distribution

In 1960, 10 of the 11 cooperatives sold over 805 million pounds of nonfat dry milk. Over 463 million pounds were sold to non-Government domestic outlets. The cooperatives reported that they did not know the final destination of some of these sales. Only 267.5 million pounds could be identified as milk sold to known types of domestic commercial users. Table 1 shows the sales distribution to these consumers. Bakery concerns, dairy concerns, meat processors, and candy manufacturers accounted for over 70 percent of the sales to these users.

---

[3] American Dry Milk Institute. Census of Dry Milk Distribution and Production Trends, 1953 and 1963. Chicago.

Table 1.--Sales of nonfat dry milk made by 10 cooperatives to known domestic commercial users

Buyer	Sales	Sales as percentage of total
	Pounds	Percent
Bakery concerns	85,975,228	32.1
Dairy concerns	79,902,244	29.9
Meat processors	22,128,889	8.3
Candy manufacturers	6,706,950	2.5
Other [1]	72,812,919	27.2
Total	267,526,230	100.0

[1] Includes other food processors and nonfood manufacturers.

Most of the cooperatives priced their dry milk on an f.o.b. plant or headquarters basis. Seven used this method exclusively. Only one priced dry milk on an f.o.b. destination basis alone. Three cooperatives used both methods.

All of the 11 cooperatives shipped most of their milk in 50- or 100-pound bags. Shipments in 100-pound bags were most common. Some milk was shipped in 50- and 200-pound drums; 27-, 40-, and 250-pound bags; and 4-1/2-pound boxes.

In 1960, nine cooperatives received and filled special orders for nonfat dry milk involving over 30 sets of specifications. Many had multiple requirements. The following list contains the types requested and the special requirements for each type:

Low Heat, Extra Grade

- Spray, activity-tested for cheese
- Low bacteria limits (various limits were specified)
- Spray, tested for starter activity
- Spray, bacteria plate count less than 25,000 per cc., solubility index of less than 0.3
- Spray, maximum densities specified
- Spray, bacteria plate count less than 30,000 per cc.
- Negative thermophilic, no yeast mold, no coliform, whey-protein-nitrogen content of 7.0

Medium Heat, Extra Grade

- Low bacteria count and density
- Spray, bulk density of 0.8 cc. per gm.

High Heat, Extra Grade

- Specified water absorption suitable for doughnuts: index 49-55 on farinograph
- Roller, coarse flake
- Whey-protein-nitrogen content of 1.0 or less
- Spray, low hemolytic action
- Spray, low thermophilic spore
- Spray, maximum amounts of mold specified
- Spray, maximum densities specified
- Spray, must meet sterilization test at 242° without curdling or coagulating
- Spray, preheated at 170° for Henzey driers
- Spray, no mold or spore

Ultrahigh Heat, Extra Grade

- Spray, negative thermophilic spore
- Spray, 212° for 30 minutes

Other

- Less than 3 percent moisture
- Dietary instant, very low bacteria count and special chemistry
- Standard plate count of less than 3,000 per gm.
- Low heat and high heat with given foaming characteristics
- Low heat and high heat with controlled sodium levels
- Dietary, coliform-free, low bacteria and high heat limit specified
- U.S. Quartermaster specifications
- School lunch specifications

Individual cooperatives set different limits on the minimum amounts of powder that could be requested in special orders. The most frequently mentioned minimum order was described as "a day's run" (the amount produced in a day). This could vary from 100 bags to a carload.

Production Costs

All of the cooperatives were asked to estimate differences in the costs of producing milk of various types. They were specifically asked to indicate additional costs involved in the production of high heat, extra grade, and ultra high heat, extra grade milk as opposed to the cost of producing high heat, regular grade, and high heat, extra grade.

Few of the cooperatives had made cost comparisons of this type. Apparently they did not consider them essential to their pricing practices. But they had estimated additional costs incurred in the production of nonfat dry milk with certain specified characteristics (table 2). These costs, generally given in cents per pound, were apparently useful as a rule of thumb in pricing nonfat milk of this type.

Not all of the additional costs resulted from changes in plant operating procedures. The production of nonfat dry milk to meet certain specifications often presented both supply and technical problems. These problems usually increased the total cost of supplying nonfat dry milk to meet specifications, although information was not available to determine the amount of the increase. The following specific problems were mentioned by the cooperatives:

Table 2.--Estimated cost increases required for the production of nonfat dry milk with specifications different from those required for the basic extra grades

Specifications	Cost increases (cents per pound)
Low bacteria count	0.0 - 0.5
Low hemolytic	0.5
Low thermophyle spore	0.5 - 1.5
Free of mold	0.0 - 0.5
Controlled sodium levels	0.5
212° @ 30 minutes	2.0
USDA requirements	0.1
Tests for culture and spore	0.125 - 0.25
High whey-protein-nitrogen content	0.35
Powder from agglomerate	0.5
Low temperature	0.25 - 0.5
Test of starter activity	0.5 - 1.75
High solubility index	0.25
Grade "A" (USPHS)	1.0 - 2.0
Coarse flake	2.5
Low whey-protein-nitrogen content	0
Water absorption within stated limits	0
Densities of various degrees	0
Specified foaming characteristics	0
Low moisture	0
U.S. Quartermaster specifications	0

1. Shortage of high-quality milk, especially in winter.
2. Slowdowns in the manufacturing process because of the high whey-protein-nitrogen content in low heat grades.
3. Extra sanitation measures needed to produce products with a low bacteria count.
4. Inappropriate or insufficient plant equipment.
5. Provision of extra funds for the training of production supervisors.
6. Buying special equipment.
7. Extra laboratory checks to control bacteria levels.
8. Segregation of closely controlled runs for testing.
9. Provision of additional personnel to supervise operations.
10. Low-quality milk with poor foaming characteristics and high bacteria count.

Selling Costs

Six cooperatives maintained records on selling costs. Among these, the cost of selling a pound of dry milk ranged from 0.125 to 1.05 cents, with 0.25 cents a pound the most frequently quoted cost. The five cooperatives that did not keep records on selling costs were able to give the items of cost involved in selling their products. These items and the number of cooperatives naming each item follow:

Cost items	Number of cooperatives listing items
Telephones	5
Salesmen	5
Sample shipments	4
Trade paper and magazine ads	2
Direct mail	1
Brochures	1

Sales and Service Staffs

All of the cooperatives maintained sales offices and employed sales personnel. All except one of the cooperatives had a staff to provide technical services to consumers.

All except one of the organizations used brokers and other kinds of sales outlets not under their direct supervision in addition to their own sales staffs and offices. The reported number of all sales outlets ranged from 1 to 50. While most of the manufacturers sold products through brokers, five also used other cooperatives as sales outlets. However, only one used other cooperatives exclusively.

Only one outside sales office was known to employ a technical staff to give service to customers, and the size of that staff was not known. This is understandable, since large amounts of the products were sold through brokers, often located some distance from the cooperative.

Job Qualifications

Service employees hired by most of the cooperatives were required to have professional and technical training. In most instances, men with college degrees in dairy manufacturing or dairy technology were employed as service personnel. Chemists, engineers, and bacteriologists were also employed. One cooperative employed men with no college background.

Qualifications required of persons to work on the sales staff were quite different. While some college graduates were hired, primary emphasis was placed on the man's ability to communicate, his experience, and his personality. One cooperative reported that it did not want technical people because they spend too much time on little problems.

Nature of Customer Contacts

Contacts with customers were made mostly through salesmen. Data supplied by the cooperatives showed that service personnel made fewer contacts than the sales staff. This is understandable, since the sales personnel made most of their contacts by telephone. The following tabulation shows the percentage of telephone contacts made by the 11 cooperatives:

Number of cooperatives	Percentage of contacts made by telephone
2	100
1	[1] 90
2	75
1	50
1	25
1	10
3 [2]	---

[1] Estimated from data supplied by cooperative.

[2] These cooperatives gave no answer.

Service employees made contacts in person, and probably spent more time per call with customers than members of the sales staff. Nevertheless, buyers were contacted principally by salesmen.

Service personnel not only made fewer contacts than sales personnel, but it seems that little effort was made to use these contacts as part of the sales effort. In 1960, only two of the associations reported making routine service calls as well as calls on request. Seven made service calls on request only, and two made no service calls.

The duties performed by servicemen were primarily those of checking on complaints, determining the underlying causes of problems, and of trying to solve them. However, one cooperative reported that its service personnel were required to make a complete plant survey and to suggest ways of eliminating plant problems. They also helped some customers produce cottage cheese, and worked with bakers on production problems.

Service to Customers

All cooperatives reported the kinds of complaints made by customers requesting service. The greatest number of calls for service came from plants finding it difficult to use dry milk in the production of cottage cheese. Curd formation and floating curds were two of their main problems. Bakers were confronted with the problem of loaf characteristics and poor gain in bread dough. Other problems were water absorption when powder was used in doughnut mixes, size of particles, and bulkiness of powder. The presence of foreign material and burned particles in products was also a problem.

Help given to customers was not always in response to complaints. Cooperatives often gave new buyers technical assistance on the use of nonfat dry milk. They also discussed the customer's specific needs for special dry milk and problems connected with its use.

Service personnel worked with plant managers, superintendents, laboratory technicians, and quality control people, or whereever they were needed.

Quality Controls

The quality control program of many of the cooperatives was centered in their individual plants. Tests were performed by all of the cooperatives at the plants. Some administered tests for moisture and dark specks only. Others administered more detailed tests, including the check test of the American Dry Milk Institute (ADMI).

Eight cooperatives did some testing at centralized laboratories. Two specifically reported that they ran complete ADMI tests, and two others reported that they ran necessary tests for member plants that did not have complete testing facilities. Two of the cooperatives used their centralized laboratories primarily for research and development, but did some testing if problems developed which their plants could not handle. One centralized laboratory was used to check composite samples of dry milk from member organizations and to make additional analyses.

All except one of the cooperatives used laboratories other than their own, or contracted with other laboratories to make additional tests of their products. Nine used the services of the American Dry Milk Institute, four used those of the U.S. Department of Agriculture (USDA), and one used those of a State laboratory. Three cooperatives sent samples to a commercial laboratory for bake testing, and one sent samples to a commercial dairy laboratory to be tested as a cross-check on their ADMI and USDA tests.

The data collected indicated that tight quality control measures are maintained by the cooperatives, and that their products are usually double-checked and often subjected to multiple testing.

Some Characteristics of Federated Cooperatives

Since federated cooperatives have special marketing problems, they were asked questions about their operations and working relations with member cooperatives.

The six federations provided some technical assistance to members. Each employed quality control personnel. Some of these men were located at federation headquarters and were used as standbys to help members when needed. Others were full-time fieldmen. Two federations employed men who worked full time on production and quality control. One employed a man to work with dry milk only. Many also made laboratory facilities available to member cooperatives.

In addition to providing technical assistance, the federations helped affiliate members plan quarterly meetings for managers, plan "learn-to-work" conferences for plant supervisors and equipment operators, train new employees, keep records, and plan yearly short courses on dry milk.

Half of the federated cooperatives used standard forms for ordering particular types of dry milk from other cooperatives. These forms, though different in wording, contained essentially the following information: (1) place of shipment, (2) date of shipment, (3) name of buyer, (4) car number or mode of transportation, (5) shipping order number, and (6) comments or special instructions. In addition to items which were included on all forms, the following items appeared on certain individual forms: (1) quantity, (2) package, size, and brand, (3) customer's number, and (4) lot number. Only two federations used order forms that specified price and terms.

Two of the three that did not use order forms ordered by telephone. One of these preferred ordering by telephone because it felt verbal requests were best understood and because telephone contacts improved relations with affiliate members. The third federation received all of the dry milk of affiliate members in accordance with a marketing agreement, and used its own plant for orders with very exacting specifications.

Managers of federations used price as their chief means of persuading associate plants to produce enough dry milk to meet demands. One manager stated, "We use 75 percent price and 25 percent persuasion." Three of the six federated organizations had marketing agreements with affiliate members so that they could be assured of receiving all of the milk produced by these cooperatives.

Four federations had sufficient stock to meet the demand for sales. Close inventory controls and estimates of market needs insured this. Three of the federations occasionally had a shortage of dry milk. Large Government orders caused the shortage at one plant. When one organization had a shortage of dry milk, it obtained powder from plants that were not members of the federation.

Special Marketing Problems of Cooperatives

All of the 11 cooperatives selected, shared two marketing problems: (1) the failure of some customers to renew orders, and (2) rejection by the Government of a considerable amount of nonfat dry milk.

Renewal of Orders

All of the cooperatives experienced times when customers failed to renew orders, and all had made attempts to determine the reason for this failure. Ten reported the price of their product as one of the reasons, and eight reported price as the primary or only reason for the failure of the customers to renew orders. Only one was unable to determine the cause.

Five cooperatives reported that customers declining to reorder had complained about the quality of the product. Other reasons given were changes in a customer's formula, dissatisfaction with service, and personality clashes. Only one cooperative stated that customers did not reorder because it could not supply powder that met their needs.

Government Rejection of Dry Milk

At the time of the survey, all of the cooperatives reported that some of their nonfat dry milk had been rejected by the Federal Government during the past 5 years. The amount of nonfat dry milk rejected during that period was about 9.0 percent of the total amount of Commodity Credit Corporation price support and Section 32[4] purchases from eight of the cooperatives that provided this information. The amount rejected ranged from less than 1 percent for one cooperative to almost 30 percent for another. Two cooperatives did not know the amount rejected and one gave insufficient data. The following tabulation shows the reasons for rejection and the number of cooperatives that had milk rejected for each reason:

Reason for rejection	Number of cooperatives
High moisture	11
High direct bacteria count	6
High plate bacteria count	3
High bacteria count[1]	4
Scorched particles	3
Excess fat	3
Excess sediments	2
Off-flavor	2
Low solubility	1

[1] Not specified as direct or plate bacteria count.

---

[4] Section 32 of Public Law 320 as amended by the 74th Congress.

Sellers' Comments

Sellers reported that two types of competition were hurting their sales. First, producers who were unable to meet the Government's qualifications were discounting dry milk through brokers at less than the Government purchase price. This practice led to the widely held viewpoint that the commercial market was basically a market for dry milk rejected by the Government. Second, sellers who produced dry milk from manufacturing grade milk were experiencing difficulty in competing with production from surplus fluid milk.

The representative of one cooperative discussed the effect of changes in the price level of nonfat dry milk. He stated that when the price rose significantly, some commercial users substituted other products for dry milk. Therefore, when prices fell again, manufacturers had to rebuild their commercial market.

Four of the sellers commented specifically on the future market for nonfat dry milk. Three stated that there would be an expanded market for nonfat dry milk that met exacting specifications of users. One saw no future in selling nonfat powder. This person said that producers must carry their processing further by making special products with dry milk.

These comments reveal several things that affect the prospect for developing commercial sales of nonfat dry milk. It should be recognized, however, that they are not necessarily representative and do not necessarily indicate what should be done.

Commercial Users of Nonfat Dry Milk

The 20 commercial users of nonfat dry milk interviewed for this report are divided into the following groups: candy manufacturers, meat packers, bakers and bakery mix manufacturers, and manufacturers of dairy products. In 1960, these manufacturers used from 20,000 to 10 million pounds of nonfat dry milk. The following tabulation shows the highest and lowest amounts used by each group:

Commercial users	Amount of nonfat dry milk used in 1960 (1,000 pounds)	
	Lowest	Highest
Bakers and bakery mix manufacturers	60	10,000
Candy Manufacturers	220	2,103
Dairy concerns	111	2,000
Meat packers	20	75

The number of manufacturing plants operated by the commercial users interviewed ranged from 1 to 20. Candy manufacturers operated from 1 to 3 plants, meat processors from 1 to 5, bakers and bakery mix manufacturers from 1 to 11, and dairy concerns from 1 to 20. The amount of dry milk used by each group was generally related to the number of plants operated. This was especially true of dairy manufacturers.

Source of Supply and Purchasing Practices

The 20 commercial users were supplied nonfat dry milk by cooperatives, proprietary firms, and brokers. Some users purchased from two or more suppliers. Only four purchased from cooperatives exclusively, while eight used cooperatives as one of their sources of supply. The following tabulation shows the number of users purchasing from the various types of suppliers in 1960.

Type of supplier	Number of commercial users purchasing from suppliers
Cooperatives only	4
Proprietary firms only	2
Brokers only	3
Cooperatives and proprietary firms	3
Cooperatives and brokers	2
Proprietary firms and brokers	3
Cooperatives, proprietary firms, and brokers	3

Nine of the users purchased quantities of dry milk in carload or truckload lots; 11 purchased quantities in less than carload or less than truckload lots.[5]

Selection of Suppliers

All commercial users were asked to indicate the factors (price, service, or quality) that influenced their selection of a supplier. The following tabulation shows factors influencing selection and the number of users influenced by each factor:

Factors influencing selection of a supplier	Number of users influenced
Price	3
Service	0
Quality of product	6
Price and service	2
Price and quality of product	3
Service and quality of product	1
Price, service, and quality of product	4
No particular factor	1

These results indicate that the quality and price of a product are the primary factors influencing selection of a supplier; service is of secondary importance. When price was the main factor, the selection was made on the basis of bids made by the sellers.

Prices Paid by Commercial Users

Prices that most commercial users paid for dry milk were established by formal bids or informal offers made by sellers. Only four users reported that the prices they paid were established entirely by negotiation, or that the market price alone established the purchase price. Two other users reported that their prices were established by a combination of negotiation and published central market prices. One buyer reported that he used the central market price in setting the price for all dry milk except Grade A, for which the price offered by the seller was used.

Prices paid for dry milk in 1960 ranged from 12.65 cents per pound to 20.0 cents per pound, the latter being the cost for a low heat, extra grade instant spray type. The following tabulation shows prices for several types of dry milk:

Type of dry milk	Price (cents per pound)
Low heat, extra grade, spray	15.20 - 20.0
Medium heat, extra grade, spray	14.20[1]
High heat, extra grade, spray	13.16 - 15.0
High heat, extra grade, roller	12.65 - 17.75

[1] Only one user reported.

Use of Nonfat Dry Milk by Commercial Users

The types and the percentage of dry milk used in the various products of the 20 commercial users are shown in table 3. Low heat powder was used exclusively by confectioners and by dairies for making cottage cheese and fluid products such as skim milk, buttermilk, chocolate drink, and half-and-half. High heat dry milk was used in the manufacture of all other products except some baked goods in which medium heat dry milk was used. Extra grade powder was used in the products of all 20 manufacturers.

Table 3 also shows the variation in the percentage of nonfat dry milk used in the four categories of products and in specific products within each category. The variations were due to differences in manufacturers' formulas or to differences in their reasons for using nonfat dry milk in a product.

Confections and dairy products contained the highest percentage of nonfat dry milk. Bakery products also contained substantial amounts. However, the percentage used in baked goods was reported on a dry weight basis. This percentage would be smaller if the data were shown on a total product basis. For example, dry milk used in cottage cheese sometimes constituted 100 percent of the nonfat solids, although only as much as 16 percent of the product weight of creamed cottage cheese.

---

[5] Nine of the 11 did not specify quantities purchased, but reported lot sizes indicating less than carload or less than truckload shipments.

The smallest difference in the amounts used in products of the same category was in that used in meat products, where the percentage ranged from 1 to approximately 4 percent of the ingredients. Meat processors did not use nonfat dry milk in much of their production.

Many reasons were given for using nonfat dry milk. Manufacturers of the same products did not give the same reasons for using it, and some used it in a particular product while others did not.

Table 3.--Types and percentage of nonfat dry milk used in the products of commercial users, 1960

Food category and product	Type of nonfat dry milk used in product	Range of amount of nonfat dry milk used
	Symbol [1]	Percent
Confections:		
Caramels	LHXS	5 - 9
Fudge	LHXS	3 - 5.5
Chocolate	LHXS	5 - 18
Nougats	LHXS	3 - 5
Meat products:		
Frankfurts	HHXS, HHXR	1 - 3.9
Loaves	HHXS, HHXR	1 - 3.9
Bologna	HHXS, HHXR	1 - 3.9
Salami	HHXS, HHXR	1 - 3
Liver sausage	HHXR	1 - 3
Minced ham	HHXR	1 - 3
Bakery products and mixes [2]:		
Bread	HHXS, HHXR	2 - 8
Cake	HHXS, HHXR, MHXS	1 - 20
Yeast doughnuts	HHXS, HHXR, MHXS	1 - 5
Cake doughnuts	HHXS, HHXR, MHXS	1 - 5
Refrigerator doughnuts	HHXS, HHXR, MHXS	1.5 - 3
Rolls	HHXS	1 - 6
Muffins	HHXS	1 - 5
Cracker mix [3]	HHXS	0.9
Frozen baked goods	HHXS	5 - 7
Dairy products:		
Ice cream	HHXS, LHXS	8 - 11
Ice milk	HHXS, LHXS	11 - 14
Sherbet	LHXS	2.5
Skim	LHXS A	1 - 2
Cottage cheese	LHXS, LHXS A	3 - 16
Buttermilk	LHXS	1 - 8.5
Chocolate drink [3]	LHXS	6
Half-and-half [3]	LHXS A	2

[1] Explanation of symbols: LH(low heat), MH(medium heat), HH(high heat), X(extra grade), R(roller), A(Grade A), S(spray).

[2] Dry weight basis.

[3] Used by only one manufacturer.

Manufacturers of Confectionery Products

Confectioners used nonfat dry milk in nougats, fudges, and in certain chocolates and caramels. They did not use it in some milk chocolate because it loses much of its flavor when stored, and makes it difficult to achieve proper balance between fats and nonfat solids. It was not used in some high grade caramels because it gave a coarser texture than fluid condensed or whole milk. The following are some reasons given for using nonfat dry milk in confectionery products: It is easy to handle and store; it is less costly than whole and fluid condensed milk; it may be reconstituted to provide a uniform input; it provides candy with needed protein and lactose. One confectioner who had tried nonfat dry milk in some of his chocolates had discontinued using it because of flavor changes that occur in powder when it is stored.

Meat Processors

The main reason given for the use of nonfat dry milk in meat products was that it can be used as an extender and that it reduces production costs. Some processors reported that they used it in frankfurters, loaves, bologna, salami, liver sausage, and minced ham. Some packers reported that it takes the tightness out of meat and helps binding quality and moisture absorption. Others said it increased the flavor of the product.

Makers of Baked Goods and Bakery Mixes

Bakers and bakery mix manufacturers were enthusiastic about the characteristics nonfat milk gave their finished products. They stated that dry milk gave more color and flavor to products and improved their eating and keeping qualities. It also gave a better texture to breads and cakes, and improved the appearance of the crust. One user said he was especially pleased with the balance it gave to sweet yeast dough and cakes.

The following are other reasons stated for using dry milk in bakery products and mixes: It helps regulate solubility of leavening acids; gives a balanced amino acid content, since it is high in protein; and helps produce good nutritional bread that meets Federal standards.

Dairy Concerns

Manufacturers of dairy products said that they used nonfat dry milk in their products because it is easy to handle and is often less costly than liquid counterparts. They also stated that it can be easily regulated to make uniform finished products. Because of its keeping qualities, an adequate supply can be kept available for emergency as well as regular needs.

When used in ice cream, ice milk, or sherbet, dry milk helps build solids not fat, and thus meets necessary standards for such mixes.

Products Competing with Nonfat Dry Milk

The only users who reported that they did not vary the percentage of nonfat dry milk used in their mixes or use substitutes for it were candy makers. At least one in all other groups of manufacturers stated that he varied the percentages used and made substitutions.

Only one meat packer reported that he varied the percentage of dry milk used in his loaves (not "meat loaf"). He added less dry milk to fatter meats because additional milk will rarely raise the percentage of yield. He also said he substituted sodium caseinate for dry milk because it was less costly and a better extender. However, this packer stated that legal requirements permit the use of only a very small amount of sodium caseinate in certain products and prohibit its use in "meat loaf."

Only one baker reported that he varied the percentage of dry milk used in his mix. This, he stated, was done to permit necessary changes in the formula during the production process. Others reported that because of the price of dry milk, they sometimes used substitutes, primarily whey solids. One stated he had used substitutes in economy products, but that he had not been fully successful in using them.

The percentage of dry milk used in the manufacture of dairy products varied more than that used in the manufacture of other products. In many cases, nonfat dry milk was itself a substitute. The amount used in products depended on the supply of skim and whole milk available at comparable prices. The percentage usually varied when it was used in conjunction with skim or fluid milk to improve the quality of products so that they could meet certain standards. For example, dry milk was used in cottage cheese to give it a uniform content of solids not fat and to fortify skim milk. Less dry milk was used when the skim milk had a high solids content.

Condensed whey solids and buttermilk powder were the most frequently mentioned substitutes for dry milk. These were substituted because they cost less than others and yet were of comparable quality. Condensed milk was sometimes used in ice cream to give it a different flavor. One manufacturer reported that he used condensed milk in ice cream when prices for solids were less than those for nonfat dry milk. But he stated that if the two types of milk were the same price, he would use dry milk because it is easier to handle.

Several manufacturers stated that they did not use dry milk in certain products simply because they found no need for it or because it gave their products undesirable characteristics. One confectioner, for example, used condensed or fluid whole milk in high grade caramels because he believed dry milk gave the caramels a coarse texture. A meat processor reported that at one time he had successfully used dry milk in making first-grade meat products. However, he did not now use it because his firm had emphasized "all meat" in its advertising and on its packages for many years.

Nonfat dry milk was not always used in some baked goods. One baker reported that he had once been successful in his use of dry milk in white and other breads, but that he now used sweet whey powder because it gave good results and was less costly. Dry milk was not used in rye and whole wheat breads.

Inplant Service

Half of the users of dry milk had not received or used inplant service from the manufacturer or the manufacturer's representative.

Sixty percent of the users who reported receiving inplant service got help from manufacturers of dry milk, 20 percent from brokers, and 10 percent from both manufacturers and brokers.

Inplant service agents worked most frequently with production supervisors and research, laboratory, and quality control groups. They also assisted buyers and plant managers.

Seven firms stated that the inplant service of the cooperatives ranged from adequate to very good. However, one user stated that while service was adequate, sellers should do more research for the buyers.

Three commercial users thought the inplant service of cooperatives inadequate, and that the representatives had insufficient technical knowledge. Two of the complaints concerned brokers and one concerned the manufacturer's own representative. One of these users stated that brokers could not answer technical questions and had to refer them to the manufacturers. He also stated that more direct contact was needed between manufacturers and users.

Some manufacturers offered commercial users complete technical help in setting up formulas and supervising production operations. Some buyers reported that they had very little contact with technical personnel of sellers, and considered the actual purpose of this contact as only an effort to get on the buyer's list of approved suppliers. Technical personnel also helped users with problems related to the use of dry milk, its delivery, storage, handling, and stock turnover.

Quality Controls

Most of the users interviewed had quality control programs of some kind. Seven used central laboratories, five used plant laboratories, and four used both kinds. None of them used regional laboratories. Only three reported not having a quality control laboratory.

All except three of the users performed tests on ingredients used in their products. Meat packers made only moisture tests on nonfat dry milk; but fat, moisture, and protein tests on total amounts of other ingredients.

The number and types of tests performed on dry milk by each of the 20 commercial users ranged from 1 to 14.

The following tabulation shows the tests performed by three groups of nonfat dry milk users:

Candy manufacturers	Dairy concerns	Baked goods and bakery mix manufacturers
Moisture	Activity	Baking [1]
Particle size	Bacteria	Grade qualification
Odor	Coliform	Butterfat
Flavor	Solids	Moisture
Color	Acidity	Titratable acidity
Fat	Copper	Bacteria
Protein	ADMI (standard)[2]	Lumps
		Odor
		Scorched particles
		Solubility index
		Color
		Packaging
		Shipping
		Farinograph

---

[1] A pretest for baking quality.

[2] May be made by ADMI, especially tests of whey-protein-nitrogen content.

Not all manufacturers within any one group performed all of the tests. Most users reported that they tested a sample from each lot of dry milk received. A few reported making only occasional checks, and one tested only when it was indicated that a test was needed.

All users of dry milk reported testing their final products. These tests ranged from precise scientific procedures involving refined statistical methods of sampling to visual tests made by one user who had no laboratory. In some instances, outside agencies did the testing, for example, the American Meat Institute or Government agencies.

Contact with Suppliers

All 20 users reported that salesmen contact them often enough to give good service. In fact, some reported that salesmen contacted them too often.

Most commercial users did not have to look for agencies with dry milk for sale. However, one occasionally tried to find a producer more qualified to meet his requirements for service, and one occasionally had to make a call to fill an order.

All 20 users were asked if the sales efforts of cooperatives were strong, moderate, or weak. Eleven users reported that sales promotion programs were strong. Three stated they were moderate, and four that they were weak. One firm that considered sellers' sales efforts weak reported that the supplier had a very good local sales office that knew the buyers' needs. Another user made all of his sales contacts by telephone. Two did not respond, and one stated that he only placed orders and did not respond to sales contacts.

Twelve users reported that salesmen occasionally introduced them to new and improved dry milk products; the other eight reported no such experience.

Many salesmen supplied users with reliable information on the value and characteristics of nonfat dry milk. However, this was not always done. Often salesmen from one seller could not provide needed information, but the salesman from another could supply it. The users who were unable to get desired information felt that the salesmen did not have adequate knowledge of their needs. However, some of the users reported that when a salesman himself did not have the information needed, he would often get it from someone else. Twenty percent of the users stated that they did not find it necessary to have salesmen supply this type of information.

Over 50 percent of the 20 users had been contacted about distress sales of nonfat dry milk. Over one-third of these did not buy this milk; those who did usually bought only from a reliable source, or made tests to assure that the milk met their specifications.

Commercial users were asked what improvements they thought should be made in the quality of dry milk, in the work of sales agencies, and in the services offered by sellers. Eight of the 20 thought that no improvements were necessary. The replies of the remaining 12 covered three areas: production, handling and marketing, and use. They were in the form of problems confronting them or suggestions for improvements. No attempt has been made to combine the ideas of one user with that of another. The following, essentially as the person interviewed gave it, are the problems and suggestions for improvements they reported:

Production

(1) The uniformity of dry milk needs improvement.
(2) The available calcium in dry milk has not been regulated.
(3) Some suppliers are unreliable and do not sell the product they claim to sell; there should be Federal controls on all component factors of production, that is, raw product, preheat, chamber, etc.

Handling and Marketing

(1) The need of suppliers within a 50-to 100-mile radius as good as present supplier.[6]
(2) Need of 50-pound bags.
(3) 100-pound bags are too bulky.
(4) Improved packaging need--too many burst bags and good bags cost more.
(5) Dry milk manufacturers need closer liaison with users.

Use

(1) Smaller dry milk manufacturers should provide a specification sheet.
(2) ADMI should put out technical bulletins for other users similar to those they put out for the baking industry.
(3) Research is needed to discover what factors determine quality of baked goods and a test that indicates if dry milk meets bakers' needs without making a bake test.
(4) Dry milk manufacturers should take into account time-temperature relationships as well as other protein devaluation factors such as pump pressure.
(5) Dry milk manufacturers should do research on the functions of milk proteins when combined with other ingredients. (Baked goods are very sensitive to milk proteins.)
(6) Not enough research by dry milk manufacturers on nonyeast and chemically leavened baked products--too much variation in the dry milk.
(7) More research is needed to discover what is in milk that causes undesirable reactions when stored or when processed in end products.
(8) Basic research on components of dry milk would be helpful, for example, casein. (User knows little about the application of this product.)
(9) Progress has been made but dispersability of dry milk is a constant problem.

These responses suggest that the thing most needed is additional research on the characteristics of nonfat dry milk and their relationship to the quality of products in which it is used.

---

[6] Eastern buyer who is supplied by a midwest firm.

Conclusions

This study indicates that, in general, cooperatives are providing nonfat dry milk of satisfactory quality in sufficient quantity to meet the needs of commercial buyers. It also points out that certain weaknesses exist in the marketing operations of these organizations, especially in the area of personal contact between buyers and sellers. If these contacts are strengthened, buyers may use more nonfat dry milk.

While liaison between buyer and seller was generally satisfactory, there are indications that some commercial users would welcome more information on the use of nonfat dry milk and how its use will affect finished products. This would mean at least two things. First, the sellers of nonfat dry milk would have to be informed on its proper use in many products. This information should be based on their research as well as data from other sources. Second, this information would have to be passed on to the buyer by salesmen with a sound technical knowledge of the proper use of nonfat dry milk in the products of their customers. The study indicates that some users thought salesmen did not have a complete knowledge of their needs.

In addition, a large number of sales contacts were made by telephone, and a few cooperatives made calls on customers to offer technical help as a routine part of their service. Good buyer - seller relations would be implemented and sales possibly increased by better coordination of sales efforts and service activities. This could be done through additional technical help to assist buyers in the use of nonfat dry milk, and service calls to discuss new uses of nonfat dry milk and the technical problems of the users.

Acknowledgment is made to the dairy cooperatives and commercial users that furnished the basic information for this study and to James B. Roof, Dairy Branch, Marketing Division, who planned the study and collected the data.

Other Publications Available

Criteria for Evaluating Dairy Cooperatives, Bulletin 14. Stanley F. Krause.

Milk Receiving Costs During Shift from Can to Bulk, General Report 77. James B. Roof.

Integrated Dairy Operations through Farmer Cooperatives, General Report 69. Anne L. Gessner.

Seasonal Milk Pricing Plans, Bulletin 12. Stanley F. Krause.

Pricing Milk According to Use, Bulletin 6. Stanley F. Krause.

Multiquart Containers--Their Effect on Milk Packaging and Handling Costs in Selected Cooperatives, General Report 90. William J. Monroe.

Selecting a Program for Butterfat Sampling, Circular 11. Homer J. Preston.

Grade A Milk Marketing by Manufacturing Co-ops, General Report 56. Donald R. Davidson.

Statistics of Farmer Cooperatives, 1962-1963, General Report 128. Bruce L. Swanson.

Comparing Bulk and Can Milk Hauling Costs, Circular 14. Joseph M. Cowden.

Impact of Dairy Cooperatives on Federal Order Milk Markets, General Report 114. Donald R. Davidson.

A copy of each of these publications may be obtained upon request while a supply is available from--

Farmer Cooperative Service
U.S. Department of Agriculture
Washington, D.C. 20250